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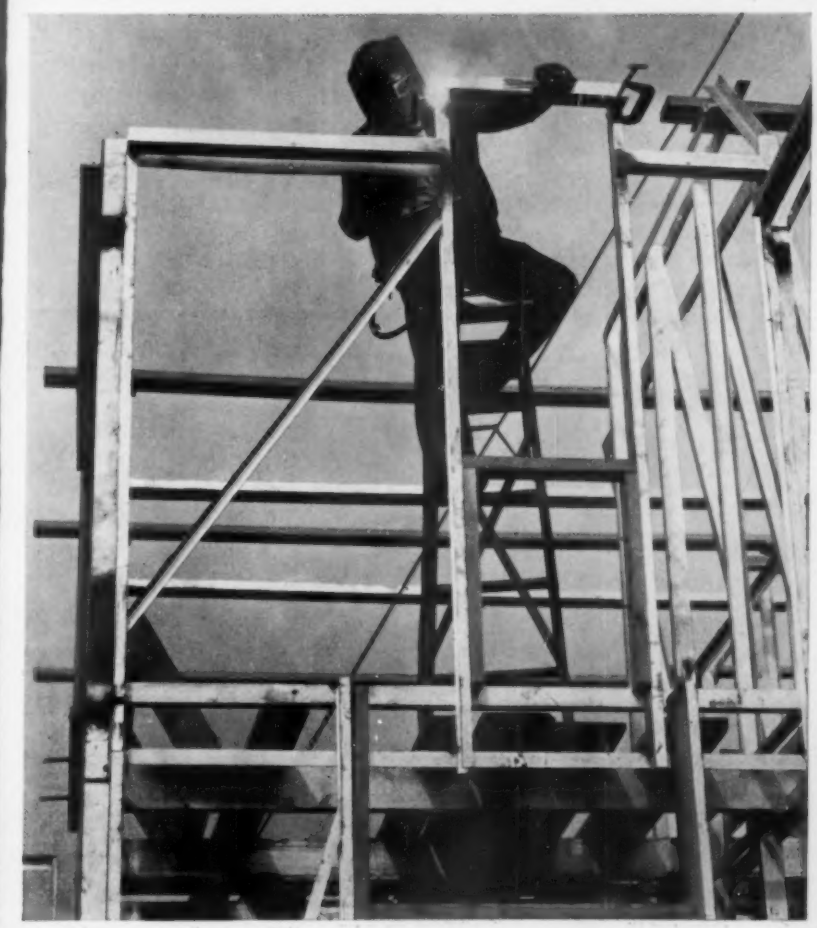
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



NOVEMBER 10, 1934

House of Steel

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A SCIENCE SERVICE PUBLICATION

SCIENCE NEWS LETTER

VOL. XXVI *No. 709*

The Weekly Summary of Current Science

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DO YOU KNOW?

The mummy of Queen Hatshepsut, Egypt's feminist ruler, has never been found.

Plants can be transplanted more successfully from a dry region to one with more moisture than the reverse.

Grapefruit refuse—the peel, rag, and some of the seeds—is being dried and fed to cattle with good results, in Florida.

To keep bacteria at just 86 degrees Fahrenheit, biologists at one university installed a heater inside an electric refrigerator.

Poplar trees, although producing a forest cover and useful timber in 25 to 50 years, do not reach maturity until nearly 100 or even 150 years old.

A British astronomer predicts that aluminum surfaced mirrors are likely to displace entirely silvered mirrors for astronomical purposes.

Rayons of the acetate type, such as celanese, melt in chloroform and acetone; these chemicals should not be used in removing spots.

Wild horses in northern Florida are to be rounded up and broken, to provide plow horses for relief families in the state.

At the ruins believed to be Homer's Troy, an altar with votive stones was recently found, and these suggest that Troy had a religion different from that prevailing in the Aegean.

An apple tree in the Ukraine is reported to have flowered for a fourth time this year, while fruits in all stages of ripeness hang on the tree from the second and third flowerings.

Pharaoh Akhnaton so earnestly believed in truth and realism that he permitted realistic portraits of himself and family, even to showing a cataract in the queen's eye.

WITH THE SCIENCES THIS WEEK

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What peace-time use has the airplane detector? p. 299.

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What is the origin of the name *Gaindatherium Browni*? p. 296. *Vertebrate Paleontology—Alfred S. Homer—Univ. of Chicago*, 1933, $5.

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What medicine is made from the lily-of-the-valley? p. 297.

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How was a wandering heart revealed to scientists? p. 296.

POPULATION

How many daughters can be expected of each 1,000 English girl infants? p. 298.

What effect will slum clearance have on the population? p. 294. *Dynamics of Population—Frank Lorimer and Frederick Osborn—Macmillan*, 1934, $4.

These curiosity arousing questions show at a glance the wide field of scientific activity from which this week's news comes. Book references in italic type are not sources of information for the article, but the references for further reading. Books cited can be supplied by Book Department, Science News Letter, at publishers' prices, postpaid in the United States.

PHYSICS

New Instrument Maps Shoal Bottoms Rapidly, Accurately

Refinement of Fathometer Sends Out Continuous Sound, Receiving Echo With Same "Transceiver"

READING hidden depths and shoals in coastwise waters with all the uncanny accuracy of a blind man running his fingertips across a page of Braille, a new instrument devised by scientists of the U. S. Coast and Geodetic Survey promises to make pilots' and navigators' charts many times as detailed and reliable as they have hitherto been, yet at a small fraction of the present cost for surveying.

The instrument, known as the Shoal Water Fathometer, can take as many as 20 soundings a second in depths of from 6 to 120 feet, and will measure differences in depth with an accuracy of about one inch. If the survey boat is cruising at ten miles an hour, a sounding can be obtained for every ten inches of bottom traversed.

This is contrasted with the old method of sounding with a hand lead, with which a boat moving only about half as fast can obtain only two depth readings a minute in water 60 feet deep, or one sounding for every 254 feet of bottom instead of every ten inches.

Other Uses

The shoal water fathometer has other possible uses besides its intended primary function in depth charting. By anchoring a boat at sea, over a bottom of known depth, the height of tides off shore can be accurately measured, as well as the height of the so-called tidal waves that follow earthquakes. In similar fashion the height of the long "ground-swell" waves that accompany storms can be measured at sea, for the instrument is very sensitive and its pointer swings up and then down every time the boat goes over a large wave. It is probable also that the shoal water fathometer can be used to aid in locating sunken ships and even smaller objects worth recovering, in water that is not too deep.

The shoal water fathometer is a development and refinement of the older deep water fathometer, which is a commercial invention already in use for a considerable number of years. Like its older relative, the shoal water fathometer works by starting a sound from the bottom of a ship, letting the sound reflect against the bottom, and then picking up the echo with suitable microphone and amplifying devices.

Uses Continuous Sound

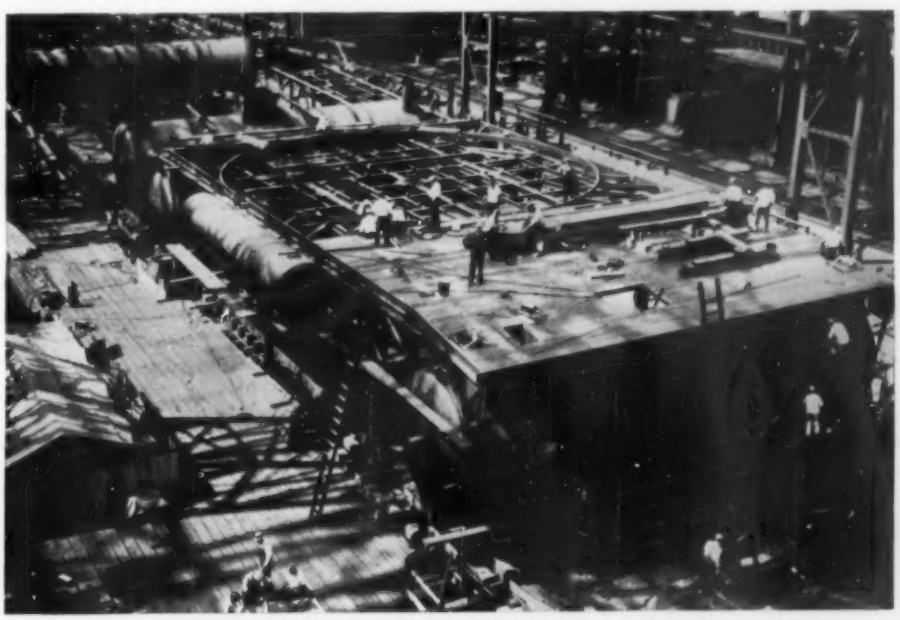
The older deep water fathometer uses discontinuous sounds, picking them up with a separate microphone, "translating" the sound into pointer-readings on a dial by means of a flashing neon tube and a rotating disk driven by a synchronous motor controlled by a governor.

To obviate the "lag" inherent in picking up sounds with a "dead" microphone diaphragm, the new shoal water microphone sends out a continuous one-tone sound from a vibrating diaphragm, and uses the same diaphragm as receiver of the echo-sound also. This part of the apparatus, being both transmitter and receiver, has been christened the "transceiver." This method wipes out practically all of the lag in transmitting the echo-sound on its return from the bottom.

Greater Accuracy

The governor used on the deep water fathometer could not hold the pointer on the dial to an accuracy closer than several feet. This is a matter of no consequence in really deep water; but an error of even one foot in water only ten feet deep would be a ten per cent. inaccuracy—something quite intolerable in shoal waters where the difference of a foot or two in bottom reading might mean the difference between a safe ship arriving on time and a sunk ship with her bottom ripped open.

To obtain a steadier speed in the pointer-disk, thus insuring greater accuracy of the dial reading, the control on the motor was changed from a governor to a tuning fork, which vibrates



FLOATING LANDING RAMPS FOR SEAPLANES

Downtown New York City will soon have facilities for landing seaplanes. Under construction in the Brooklyn Navy Yard are two floating landing ramps for amphibian seaplanes. One will be moored at the foot of Wall Street and the other at 31st Street, both in the East River. Each ramp will be 89 feet long, 56 feet wide and weigh 170 tons complete. Two steel tanks each 12 feet in diameter furnish the buoyancy for the landing unit. Construction is of welded steel throughout with the exception of the pine decking. A motor-operated turntable in the center of the top surface provides means of turning the planes about for take-off. In operation the seaplane taxies onto the surface of the turntable which is one-fourth submerged by partially flooding one tank. The ramp is then raised to level by forcing the water from the tank with pneumatic pressure.

constantly at 1025 cycles a second. This reduces the tolerated inaccuracy of the dial reading from feet to inches.

As installed on the working vessels of the U. S. Coast and Geodetic Survey, the dial readings are taken off at suitable intervals by an officer and jotted down manually. It would be possible to make the instrument self-recording, and this has been done in one experimental installation; but at present the Survey does not feel that general use of automatic recording is necessary.

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GEOLOGY

Meteorite Explosion May Have Formed Meteor Crater

Study of High-Velocity Bullets Shows Masses of Iron Coming From Outer Space Would Be Vaporized on Impact

METEOR Crater in Arizona, and similar great pits elsewhere in the world, may well have been gouged out by the cannonball-like impact of a great mass of meteoric iron roaring in from outer space. But there is little use hunting for the iron now, if the calculations set forth by Prof. C. C. Wylie of the University of Iowa are correct (*Popular Astronomy, October*). Practically all of it, he holds, was literally blown into thin air, in a tremendous explosive vaporization of the erstwhile solid metal.

Prof. Wylie's studies, based on the impact behavior of high-velocity rifle bullets, lend strong support to the "explosion" theory of meteorite crater formation, held by himself and a number of his colleagues, as opposed to the "cannonball" theory, which supposes that the meteorite buried itself on striking, without losing any great part of its mass through conversion into vapor.

Prof. Wylie states that lead bullets, striking at a velocity of 2,700 feet a second, which is the muzzle velocity of the American service rifle, melt completely and convert about five per cent. of their mass into lead vapor. As the velocities are stepped up, larger percentages of the solid lead flash over into vapor on striking the target, until a bullet moving at 5,000 feet (nearly a mile) a second would have 94 per cent. of its mass instantly vaporized.

Much Higher Speeds

Large meteorites, the Iowa astronomer states, travel at much higher velocities than that, and are not seriously impeded by atmospheric resistance as they approach the earth.

"If an iron meteorite strikes at 14,000 feet per second, the total energy would be sufficient to melt and vaporize the iron," he declares. "The energy of the explosion would be approximately that of the explosion of its own weight of nitroglycerin. . . . For higher velocities the energy of the explosion increases rapidly. At 25 miles per second it would be 120 times that of an equal weight of nitroglycerin."

Assuming a mass of about 700,000 tons for the iron mass that formed Meteor Crater in Arizona, and a striking velocity of 25 miles per second, Prof. Wylie calculates an explosive force from its vaporization equivalent to that of one hundred million tons of nitroglycerin.

"Even this estimate," he comments, "is evidently much too large. Comparison with the craters produced by the largest mines set off during the World War indicates that two hundred thousand tons of nitroglycerin would have been sufficient to produce the famous crater."

Explains Fragments

Iron fragments, however, are found in and near meteorite craters, which would seem at first to contradict Prof. Wylie's theory. However, he calls attention first to the fact that the nose of a high-velocity bullet is sometimes found, unmelted, in the target, and argues that something of the same nature might happen to the "impact end" of a meteorite. Furthermore, when the explosion occurs, unmelted portions of the meteorite might be blown out. Finally, the vaporized iron left in the crater would of course immediately re-condense into liquid iron, so that rock falling back in would have a considerable amount of iron melted into it.

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AGRICULTURE

Peru Restricts Exports Of Rotenone Plants

PLANTS containing the valuable insect-poisoning compound known as rotenone have been placed under very severe export restrictions by the government of Peru, the bureau of entomology, U. S. Department of Agriculture, has learned. Living plants or their roots, which might be used for the establishment of cultivation in other countries, are barred from export altogether. Only dried roots, containing not more than ten per cent. of water, may leave the country; and that only until mills for the extraction of rotenone shall have been established in Peru.

Six different genera of plants are affected by the Peruvian order. They all belong to the legumes, or bean family, and are known to the trade collectively as "cubé," a name originally applied by South American Indians to any fish-poisoning plant. These rotenone-containing plants were originally used by the natives in wholesale fish-killing, as related plants were also used by the Malays in the East Indies. Subsequently their active principle was found to be a most efficient insecticide, so that the dried plants now have a world-wide market.

Provides Major Source

Peru has been a major source of the rotenone used in the United States, so that the effect of the Peruvian export restriction will probably be a material rise in price. However, the effect is not expected to be permanent, for other South American countries have large "cubé" resources, and Brazil is already exporting quantities of the plants, from the port of Pará. The United States might conceivably also send to the East Indies for a part of its rotenone-plant requirements, though at present the entire product of that region is being absorbed by Great Britain and Japan.

If a general export embargo should force the price of rotenone too high for toleration in the American market, it might be possible for this country to develop its own supply. There are several rotenone-containing legumes native to the United States, most notably the Southern seashore plant known as "Devil's shoestring." However, it is still more economical to import materials for rotenone extraction.

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MEDICINE

New Kind of Ether Acts Faster; Recovery is Easier

Anesthetic Made-to-Order to Meet Specifications Has Now Proved Its Value in Practical Use

A NEW kind of ether, faster-acting and with few or none of the unpleasant after-effects of the familiar ethyl ether, is being used in a few selected hospitals throughout the country to ease the pains of mothers during the birth of their children, to bring quick, easy oblivion for teeth extractions, and for many other surgical procedures.

Only two years old, neither yet on the market nor ready for general use, but with a thrilling history already, the new anesthetic has aroused enthusiasm in some scientists who have tried it and doubt in others.

Made-to-Order

It was made-to-order at the request of a scientist who wrote its name and chemical formula and predicted its usefulness as an anesthetic before it actually existed. Other important figures in the dramatic development of the substance are two Canadian physicians who made human guinea pigs of themselves to test its safety, and some five hundred patients in Philadelphia hospitals and over three hundred mothers, in a Montreal maternity hospital, whose records testify to its value.

It was Dr. Chauncey D. Leake, University of California professor of pharmacology, who figured out with pencil and paper that a substance known to chemists in theory only and which combined the structural characteristics of ethyl ether and ethylene would be a good anesthetic. The substance is divinyl ether, to call it by one of its several chemical names.

Drs. Randolph Major and W. T. Ruigh at Princeton University made it for Dr. Leake.

The human guinea pigs who gave it its first human trial were Drs. S. Gelfan and I. R. Bell of the University of Alberta. These dauntless scientists put each other to sleep with it before daring to try it on patients.

Before that, Dr. Leake and associates in San Francisco, following established scientific custom, tried the new anesthetic on laboratory animals, mice and dogs. They found, as they had expected, that it put the animals to sleep more quickly and easily than ether or ethylene and that they came out of the anesthetic more rapidly and, generally, with less nausea or other complications. There were no significant harmful effects on the various organs. Divinyl ether puts human patients to sleep in a minute and a half and they come out of the anesthetic within two or three minutes. A great advantage to the surgeon is the fact that it is better than other common general anesthetics for relaxing the abdomen without paralyzing the muscles between the ribs which are part of the breathing apparatus.

It was first used at a surgical operation by Dr. Dorothy Wood, anesthetist at the University of California Hospital in San Francisco. The patient was a very fat woman, such as would be considered an unfavorable subject for operation. The operation itself was the difficult and lengthy procedure of removing the gallbladder. At this operation the practical advantages of the new anesthetic were clearly evident, Dr. Leake observed.

Not Ideal

However, in reporting the new anesthetic to the American Medical Association he stated that divinyl ether is not the ideal inhalation anesthetic. For one thing, it is explosive, and for another, it may prove expensive to use. Then, too, it may decompose with the appearance of such dangerous irritants as formaldehyde and formic acid.

Dr. Leake hopes that further study of the theoretic action on the body of various chemical combinations, such as led to the development of divinyl ether, will some day produce a more nearly perfect or even the ideal general anesthetic.

Meanwhile, extensive investigations of divinyl ether with animals and patients have been made by a group of Philadelphia medical scientists, Drs. Samuel Goldschmidt, I. S. Ravdin, Edward Beach, Bald- (*Turn to Page* 294)

RUINS OF A PERSIAN MOSQUE

In the early days when the faith of Mohammed was spreading, Persia had ten mosques that received mention in historic writings. This strong-walled building now being excavated in the ruins of Rayy is thought to be one of the historic ten, the mosque of Al Mahdi.

ARCHAEOLOGY

Seals Unearthed At Rayy Shed Light on Persian Past

PREHISTORIC Persia may at last be fitted into the jig-saw puzzle of the ancient world, it appears from new evidence unearthed at ruins of Rayy, in Persia.

In prehistoric ruins of unknown antiquity, archaeologists have found fragments of pottery with impressions of seal cylinders. These seals, it is hoped, will link the ancient Persians with Mesopotamia to the westward, and more particularly with some definite period in the stream of early civilization there.

Excavations at Rayy are revealing ruins and relics belonging to almost every age of Persia's past. The expedition, under joint auspices of the Boston Museum of Fine Arts and the Mrs. William Boyce Thompson Foundation of the University of Pennsylvania Museum, is investigating an area of nearly 50 square miles.

Discoveries just announced include these: Delightfully painted pottery made in prehistoric times; about 500 copper coins dating from 125 B.C. to 12 A.D., found in a well shaft; glazed and plain

pottery of the Islamic period, beginning in 645 A.D., and tablets bearing the name of Allah in Kufic; an Islamic mosque; a tomb tower of medieval days still containing fragments of the silk, brocade, wool, and cotton garments in which the dead were wrapped. Solid gypsum vaults of the graves are held responsible for the preservation of the fabric through more than seven centuries.

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POPULATION

Survey Changes in Quality Of America's Population

AMERICA is getting her growth. Soon—within the next sixteen years—she will have reached that state of national adulthood known to population experts as a "stationary population." Provided death rates and fertility rates remain exactly as they are at the present time, by the year 1950 young Americans will come into the world only just fast enough to replace those older ones who are dying. After that there is likely to be a period of slow decrease; but scientific prediction can not reach far into the future.

This is one of the conclusions of Dr. Frank Lorimer and Frederick Osborn in a new book, "Dynamics of Population," just published by Macmillan.

Description of a population as stationary only means that its numbers are not increasing. But the population will be far from static in other respects, for some sections or classes of the population are increasing and will continue to increase at a far greater rate than others. The "stationary population" may therefore be thought of as a brew disturbed by yeast, with some elements constantly foaming to the top and other elements gradually disappearing.

Survey Raised Questions

The investigation reported by Drs. Lorimer and Osborn was undertaken to discover what elements in America's population are increasing more rapidly and which are the ones that are in danger of being lost. They raise the question: What are the physical and mental differences between these groups? What effect will the population changes have on American life in the future?

The class of unskilled labor is increasing, the scientists found, despite the fact that America is having less and less use for untrained workers. The rural population is increasing much faster than the city population despite the fact that America needs fewer and fewer agricultural producers. And although the United States is making a great conscious effort toward improving the social condition of her citizens and toward spreading education, these efforts are being counteracted by the blind forces governing population growth. For the number of the intelligent is not increasing nearly so rapidly as is the number of those with inferior educational background. Furthermore it is probably true, although this is less apparent, that the number of those least capable of profiting from educational opportunities is also increasing.

Mental Race Suicide?

"Present population trends are tending to create a serious economic imbalance between agriculture and industry, and perhaps between some other groups in our economic structure," the authors say. "There is an apparent very gradual but by no means negligible drift toward undermining our most precious inheritance, the capacity for high intelligence. Very certainly there is a strong force at work that runs exactly counter in its effects on social environment to our conscious educational efforts. And yet this whole set of forces, perhaps second in social importance only to the need for a more stable and equitable economic order, has remained largely neglected by social scientists."

The remedy, it is believed, lies fortunately in measures that also make for greater social good at the present. Slum clearance is one of these. Paradoxically, the less fit classes reproduce most rapidly in the crowded conditions of the slums, while the better classes have larger families when they are not crowded. Better housing with more room serves, it seems, to reduce the number of the less desirable and also to increase the numbers of the socially fit. The improvement of the conditions of rural living is given even greater emphasis, as tending to reduce fertility in backward areas, and to attract superior families into the rural communities that will be our chief source of future population supply.

Some extension of sterilization is recommended, but it is pointed out that in view of the principles of modern genetics no far-reaching effects can be expected from preventing a few extremely handicapped individuals from reproducing. The spread of birth control is seen to be more important, so that these measures come into general use among the less intelligent as well as among the more intelligent. Economic provisions making possible early marriages and a change of attitude toward the large family are other possible steps toward preventing the loss of America's most precious heritage, intelligence.

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win Lucke, G. P. Muller, C. G. Johnston and W. L. Ruigh. Not until they had given it to nearly five hundred patients of all ages and conditions and for very many kinds of operations, did they report their results.

Its advantages are such that they think it will probably have a definite place in the field of anesthesia. Because there is very little vomiting and the patient recovers quickly after divinyl ether, the Philadelphia scientists think this new anesthetic is particularly suitable for extracting teeth and minor operations after which the patient can be up and about.

Divinyl ether does have some effect on the liver, they found, and therefore some precautions must be taken in its use. These relate to the type of patient and the length of time he must be under the anesthetic.

Careful tests of the effects of divinyl ether on the liver of dogs showed that this anesthetic does not disturb the liver to any appreciable extent, Dr. Wesley Bourne and Douglas W. Sparling of McGill University reported to the Congress of Anesthetists. It has been given to over three hundred patients at the Royal Victoria Maternity Hospital in Montreal to vanquish the pains of childbirth. From observation of these cases, Drs. Bourne and Sparling reported that the new anesthetic seems particularly suitable for this purpose. They find it not a suitable anesthetic for laboratory dogs.

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CLAP HANDS

These whirling dwarfs are an Egyptian mechanical toy almost 4,000 years old, now discovered in a tomb at Lisht. Like well-trained dancers, the little figures are executing the same precise step, and their upraised hands appear to be clapping vigorously to mark time. (Photograph courtesy of The Metropolitan Museum of Art.)

ARCHAEOLOGY

Dancing-Dwarf Mechanical Toy Found in Egyptian Tomb

A CLEVER mechanical toy almost 4,000 years old, and the mystery of two borrowed coffins, have been unearthed by the Egyptian Expedition of the Metropolitan Museum of Art.

Excavating near the royal cemetery at Lisht, the Egyptologists dug their way into a tomb containing the mummy of a young Egyptian girl named Hepy buried in a set of borrowed coffins, says the first report of the expedition, by Ambrose Lansing.

Admitting that the mystery of Hepy has not been solved yet, Mr. Lansing congratulates the expedition on the rare objects which the tomb has yielded.

Who Was the Girl?

The tentative solution is that the owner of the ancient tomb was buried before his monumental tomb was finished. And then, still before the structure was finished, vandals plundered his body and buried the girl Hepy—who was she?—in his coffins. The owner's name was blotted off the outside of the interior coffin, and Hepy's name painted on. But the plunderers did not bother to alter the lining of the coffin the same way, and there the original owner was proclaimed.

Gold ornaments worn by the girl around her waist, neck, arm and ankle were found badly scattered. These were no funerary adornments, but her actual jewelry worn in life, as dents in the goldwork prove.

Four dolls are among objects found embedded in sticky clay and mud in a passage leading to the tomb. But the discovery which startled the Egyptologists was to find four figures of dancing dwarfs, a mechanical toy almost 4,000 years old and very cleverly made. When wound up with threads, the ivory dwarfs whirled briskly on spools set in holes in an ivory base.

There is an Egyptian inscription from the pyramid age telling of a small boy Pharaoh overjoyed by the gift of a "dwarf of the divine dances" brought by an expedition beyond the Upper Nile. The mechanical toy seems to portray the exact type of dwarf that delighted the child Pharoah.

Mr. Lansing links the ivory dwarfs with pygmies of Central Africa in their physical traits, and says, "It is therefore quite possible that in these figures we have the first representation of the Central African pygmies, which until recently were considered an invention of classical writers."

Emotional Egyptians

The dancing men, with knees bent, and arms upraised as if to clap hands, have expressions of violent emotion on their faces. For Egyptians in art to wear anything but straight faces is so rare as to be astonishing, Mr. Lansing points out. A king in Egyptian art seems to have the same emotions in battle as when at ease with the ladies of his harem. The dwarfs are pronounced unique in Egyptian art for their vigor and animation.

Whether the mechanical dwarfs belonged to the girl Hepy or to the man Se'n-Worset who owned the tomb, is part of the mystery that the Egyptologists have not fathomed.

The expedition completed fourteen years of excavation at Lisht, this season, and having investigated the royal cemetery and some outlying graves, will not resume work there.

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PHOTOGRAPHY

Medical Movie of Stomach Forerunner of Film Cartoon

MEDICAL science, in studying by photograph the rythmic movements of the human stomach, used methods of animation closely akin to the present technique of the animated cartoons almost ten years before the pioneer adventures of Felix the Cat, Jerry on the Job and Krazy Kat.

How and why medicine "scooped" the motion picture industry in the field of animation was revealed by R. F. Mitchell and Dr. L. G. Cole in their report on "Historical Notes on X-ray Cinematograph" to the Society of Motion Pictures Engineers meeting. In 1910 physicians in Detroit viewed an animated film showing the form, shape and peristaltic wave-like motion of the stomach, Dr. Cole and Mr. Mitchell reported.

Scores of X-ray photographs were made of a stomach of the human body. Cut-outs were made of the outline of the stomach. These cutouts were then reversed so that the plain white cardboard background of the cutout was photographed instead of the picture of the cutout itself. The sequence of white backgrounds was then photographed onto a continuous film and shown in October, 1910.

This procedure of photographing the white cardboard cutouts of the stomach probably was the first attempt at animation, and, therefore, this particular film becomes of interest from an historical standpoint as it has already from a legal standpoint in that it antedated, by approximately a decade, the animation of Felix the Cat by Pat Sullivan, declared the speakers.

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PHYSIOLOGY

X-Ray Movies Show Heart Wanders in New-Born Baby

X-RAY motion pictures dispelled a recent scare of thymus deaths among new-born infants, Dr. Robert F. James, research physician of the Westinghouse Electric Co., reported to the Society of Motion Picture Engineers.

"X-ray photographs," Dr. James reported, "disclosed a large shadow in the vicinity of the thymus, a ductless gland in the upper section of the chest. But none of these infants showed typical symptoms of the disease and subsequent X-ray pictures failed to show the shadow.

"The attending physicians who observed the shadow concluded that the penetrating X-radiation used in making the photographs checked the thymus enlargement. When continuous X-ray motion pictures were made, however, the shadow taken to be an enlarged thymus was found to be merely the shadow of the infant heart, coming and going with the pulse."

In new-born infants, Dr. James indicated, the positions of the organs of the body are not completely fixed as they are later in life. The hearts of these infants suspected of thymus enlargement were simply in an unexpected place. Without motion pictures by X-rays the phenomenon would not have been disclosed.

Science News Letter, November 10, 1934

NUTRITION

Calls Food Faddists A Menace to Health

FOOD faddists—"the vegetarians, the meat eaters, the drinkers of buttermilk, and gnawers of apples"—insult reason and menace health, the meeting of the American Dietetic Association was informed.

Deploring the magnifying of half truths and other devices of "high powered salesmanship," Dr. Martin E. Rehfuss, professor of clinical medicine at Jefferson Medical College, Philadelphia, said:

"Diet faddists have reached a point where they are a positive menace to the health of the community and an insult to the reasoning of intelligent men and women."

People have become food conscious to a superlative degree, Dr. Rehfuss declared.

Men and women in early stages of tuberculosis, cancer, and other diseases may be found today seeking relief in diet fads, he said, and meanwhile losing valuable time in getting treatment. Many get their diet advice entirely by mail, thus ignoring the first rule in going on a special diet—to have a complete physical and laboratory examination.

Dr. Rehfuss described to the dietitians biological experiments he has conducted which disprove the recent popular suggestion that proteins and carbohydrates should not be eaten at the same meal. Dr. Rehfuss tested the digestibility of these two kinds of food together when eaten by normally healthy people and in addition he tested fifty patients suffering from various diseases.

Chopped beef was used in the tests to represent protein and mashed potatoes to represent carbohydrate. In the sick persons, some suffering from stomach disease, gall bladder trouble, nervous disorders, and other ailments, it took only about three minutes longer for the stomach to digest the beef and potatoes together than the meat alone.

"This explodes the idea that these foods will not digest in the stomach when combined," Dr. Rehfuss pointed out.

Science News Letter, November 10, 1934

PALEONTOLOGY

Ancestral Rhinoceros Skull Found in Northern India

THE skull of a one-horned rhinoceros, apparently the ancestor of all modern rhinoceroses, has been found in the Siwalik Hills of northern India, and is now in the American Museum of Natural History. A detailed study of the specimen by Edwin H. Colbert, of the Museum staff, indicates that it represents an animal quite different from any previously known in its group, so that it has been set up as a new genus and species: *Gaindatherium browni.*

The first or generic name is compounded of a Hindustani word for rhinoceros, *gainda,* and the Greek word meaning beast. The second or specific name is given in honor of Dr. Barnum Brown, who obtained the skull for the Museum.

The skull is somewhat smaller than that of a full-grown modern rhinoceros, but the snout is relatively longer. The teeth are broad, and comparatively simple in structure. In general, the animal represents a more primitive evolutionary type.

Science News Letter, November 10, 1934

IN SCIENCE

GEOLOGY

Find Wave Print on Sands Of Time in Ancient Rock

HALF a billion years ago, a series of ripples played over the shallow water at the beach-edge of a lake, in what is now the state of Arizona. One of the ripple-marks, left by the water in the soft sand that day, has just been identified as such, hardened into rock through long burial and pressure.

The discovery of this well preserved water ripple mark in the Archean sediments of the Grand Canyon, a section of the world's oldest sedimentary rocks, has been announced by Drs. J. H. Maxson and Ian Campbell, geologists of the California Institute of Technology. It has the distinction of being the oldest recorded fossil of its type in North America.

The significance and interest in the discovery, apart from its antiquity, are indicated in the interpretation of the record of geologic processes and history, which in this case suggests a lake deposit origin.

Science News Letter, November 10, 1934

ENGINEERING

Largest Steel Frame Single Dwelling

See Front Cover

IN THE exclusive Ottawa Hills residential section of Toledo, Ohio, is rising the framework of the largest steel frame home ever constructed, as shown on the cover illustration of SCIENCE NEWS LETTER this week. Since the home is of welded design, the steel carpenters working on it use only one tool —the electric arc. No noise of hammers echoes throughout the neighborhood; only the hissing of the flame directed by the grotesquely-masked welder.

Fifteen tons of steel will go into the completed structure. Its cost will be approximately the same as wood.

Whole sections of the walls are welded on the ground, then erected and joined with connecting sections into one solid piece of metal.

Science News Letter, November 10, 1934

NCE FIELDS

ENGINEERING

Robot "Brain" Solves Simultaneous Equations

A NEW mechanical robot "brain" capable of solving what mathematicians call "simultaneous equations" is working for science at the Massachusetts Institute of Technology.

Engineers hail this latest mechanical "slave" because it is believed to be the first mechanical calculating machine capable of handling and grinding out answers to the simultaneous equations that enter so largely into the design of buildings and other engineering structures.

Dr. John B. Wilbur designed it under the direction of Dr. Vannevar Bush, M. I. T. vice-president. The new machine consists of a maze of pulleys and steel tapes. Operators set scales corresponding to the values in the equations and after the machine operates the answers are read from other scales.

Science News Letter, November 10, 1934

ORNITHOLOGY

Wildfowl Suffer Through Faithfulness to "Flyways"

LONG before aviation experts sought east-to-west flying routes across North America, the streaming squadrons of ducks, geese, swan and other wildfowl had established four great main north-south "flyways" for their spring and fall migrations. At the meeting of the American Ornithological Union in Chicago, Frederick C. Lincoln of the U. S. Biological Survey described these age-old roads of the sky, and told of the grief that recent drought, overshooting, agricultural spread and other factors have brought to the birds that perforce still follow the paths flown by their ancestors.

The four flyways are designated respectively as Atlantic, Mississippi, Central and Pacific. The Atlantic and Pacific flyways, as their names indicate, lie roughly between the sea-edge and the nearest high mountain ranges, although subsidiary migration routes spread fanwise inland. The Mississippi flyway guides its wildfowl down the great central valley of the Mississippi and its tributaries. The Central flyway spreads from the upper Missouri and the western boundary of Arkansas over into the region around the Great Salt Lake and thence southward.

"There is no question that heavy overshooting, drainage, agricultural activities and drought have reduced the numbers of migratory waterfowl over the entire continent," said Mr. Lincoln in concluding; "but it is apparent that the decrease has been much more rapid in the central and Pacific coast areas. Because of the strong attachment that these birds have for their ancestral migration routes, abundance in one flyway does not mean an increase in other flyways in succeeding seasons.

"It would therefore appear inevitable that if the depletion of the birds of the Central and Pacific flyways . . . continues as it has in the last few years, a complete suspension of shooting privileges will be imperative to preserve the remnants of the waterfowl. The results of the present shooting season may be decisive."

Science News Letter, November 10, 1934

PHARMACY

Standardizes Two Extracts To Fight Heart Disease

DOCTORS fighting heart disease now have two more weapons to use, it appears from an announcement made recently by Dr. James C. Munch, director of research at Temple University's School of Pharmacy.

Heretofore digitalis has been chiefly relied on as a heart stimulant. It had the disadvantage that after taking it for a while, the patient built up a resistance to it, so that it was no longer effective. Physicians had then to prescribe other stimulants until the resistance to digitalis wore off.

Two important medicines thus used as substitutes for digitalis were an extract from lily-of-the-valley root, called *Convallaria majalis,* and an extract from another plant, *Adonis,* or pheasant eye. These plant products varied widely in strength and potency and also suffered by deterioration. When a physician prescribed them he did not know what the patient would get at the drug store. Now Dr. Munch has found a way to standardize these medicines as digitalis is standardized. This, he believes, will place them in the same class as digitalis.

Science News Letter, November 10, 1934

EVOLUTION

"Missing Link" in Modern Dog's Ancestry Discovered

THE missing link in the long ancestry of the modern dog has been discovered, as a result of research by Paul O. McGrew, in the museum of paleontology at the University of California.

In tabulating fossil specimens obtained in an expedition carried on last summer near Valentine, Nebr., Mr. McGrew came across the skull of a primitive dog, belonging to the lower pliocene geologic period, about 17,000,000 years ago. Examination of the skull revealed characteristics in line with those of the dog of today. The resemblance was so clearly marked that at first it was thought the skull represented a primitive species of *Canis,* which is our modern dog. This theory was later discarded, and the specimen was established as being that of a primitive dog, directly descended from dogs of the lower miocene period, some 37,000,000 years ago.

The remote ancestor of the modern dog first made its appearance about 50,000,000 years ago, in the oligocene period. The dog of that day was about the size of a California ground squirrel. From this it gradually evolved through the ages into its present day form.

Science News Letter, November 10, 1934

ASTRONOMY

Fireball Rivalled Moon In Its Brilliance

WHEN a meteoric fireball flashed over Maryland, Pennsylvania, New Jersey and adjacent states recently (Oct. 17), it rivalled the moon in brilliance for those who were lucky enough to be near its path, Prof. Charles P. Oliver, director of the Flower Astronomical Observatory, and president of the American Meteor Society, found after a preliminary inspection of 125 reports sent him by those who saw it.

Although several thought that the meteor fell near them, there is no real evidence that the meteor hit the ground. One observation made from Princeton stated that the fireball disappeared when about 10 to 15 degrees above the horizon, and this proves, in Prof. Olivier's opinion, that the object, at least while still glowing, did not come very near the ground.

Prof. Olivier's investigation will not be completed for several weeks.

Science News Letter, November 10, 1934

POPULATION

Is Man Doomed to Extinction?

British Writer Pictures England 300 Years Hence Reduced to 45,000 Unless Present Tendencies Change

By MARJORIE VAN de WATER

WILL the great crowded areas of New York and London one day be deserted mazes of deteriorating masonry devoid of human spectators?

Will the tall skyscrapers now housing the hustling activity of business become the abandoned monuments of a departed race?

Will man, who has in the course of time come to conquer the world of living things, come at last to extinction, wiped out by the action of social conditions which he has himself set up?

Such fantastic pictures as these are brought to mind by the statistics showing what is right now happening to the populations of the world. Improbable —incredible—they may be, and yet they are pointed to by present day facts as much more likely than the nightmares of overpopulation formerly feared by the followers of that direful economic prophet Malthus.

The people of the United States and Great Britain, in particular, face ultimate extinction unless some unforeseen change occurs in the present rates of death and reproduction. At least this is the prophecy of Dr. Enid Charles, British writer on population problems, in a book just published under the title of "The Twilight of Parenthood," (Norton.)

War Not Justified

Wars cannot be justified on the basis that they prevent an intolerable overcrowding of man by his fellows, Dr. Charles shows. Neither is the problem of feeding future populations going to be extremely difficult. Even in Japan, where overcrowding is now a reality, war is not a necessary solution.

"If the energy which Japan devotes to industry, and more especially to armaments, were in part diverted to the cooperative development of the food resources of the community, the present relation between the density of the population and the available food supply could be greatly changed," Dr. Charles stated.

A nation having a birth rate exceeding its death rate is not thereby assured of a continuously increasing population in the future, she points out. The age of the people is of great importance in this connection.

In a new land, or pioneer community, the first settlers are generally young people of the age most suitable for the founding of homes and rearing of families. The population at first would increase rapidly. Within a few years, however, the birth rate would start declining because of the increasing age of the adult women. The death rate would increase because of the higher risk of death among young children and old people. Thus the population after its initial rise might start to decline again.

In order that a nation may continue to grow in population without the external aid of immigration, it is necessary that each thousand women in the country eventually bring into the world more than a thousand daughters.

Not Enough to Replace

For a thousand girl babies born today (statistics from Ukraine are used as an example) not more than 733 will live to be old enough to have children of their own. And very few girls marry as soon as they physically mature enough to do so. Yet each year brings a decrease in the number of survivors of the original 1,000. By the age of 25, not more than 695 are still living, and at this age too, the number of children born to them starts to decrease.

Fifty years from now, it may be expected that the original 1,000 will have dwindled to 585. Altogether a total of 3,462 children will have been born to them, and of these only 1,675 will be daughters. This means that in the Ukraine, each thousand potential mothers will be replaced in a generation by 1,675 mothers—a slight gain. If this latter number were to be an even thousand, then the result would be not a growing population but a stationary one. When the rate of replacement drops below 1,000 the result means that the population is doomed to extinction.

The rate of replacement of mothers in England and Wales and the United States is now below that point.

Each thousand girl infants born today in England and Wales can expect to eventually give birth to only 750 girl infants. The rate for the United States is probably about the same. This rate of replacement of mothers will eventually lead to a stable age composition for the population, Dr. Charles predicts.

Rapid Reduction

She adds a grave warning: "When this point has been reached the population will be reduced in the proportion three to four in each subsequent generation. The determination of the exact length of time implied by the term generation involves a calculation based upon data used in determining the net reproduction rate. In practice it has never been found to diverge very much from 30 years.

"Let us suppose that the present fertility and mortality of England and Wales remain as they are. Once a stable age composition has been reached a population, equivalent to that of England and Wales (about 45 millions) at the present time, would be reduced to less than 6 millions, that is about half the size of greater London in about 200 years."

This picture of an England whose depleted peoples could all be contained within half the confines of one of her great cities may be paralleled by a vision of the United States reduced in numbers at a comparable rate.

Picture in your mind some cataclysmic tragedy which devastated the entire United States with the sole exception of the area contained within the two states of New York and New Jersey. Not one soul remaining with the breath of life in all the other forty-six states or even in the District of Columbia. A great nation of nearly 123 millions reduced to less than 17 millions.

But this vanishing of our people is what Dr. Charles predicts on the basis of the present rate replacement. What if a larger proportion of women fail to marry and bring daughters into the

world? What if the size of the family is further limited by physiological or psychological reasons?

"The possibilities of rapid decrease are not completely exhausted unless we take into account the fact that the present net reproduction rate of about 0.75 (replacement of one hundred mothers by only 75 mothers) has been reached by a process of continuous decline over a number of years," Dr. Charles continues.

"There seems to be no particular reason for assuming that the decline must stop at the point now reached. If the net reproduction rate were to fall further, say to 0.5, the population would be halving itself every 30 years, when a stable age composition had been reached.

"In the space of 300 years a population of 45,000,000 would be reduced to 45,000 which is the size of a small English town.

Speculative

"Such forecasts of the future, however speculative, indicate the change in perspective which has taken place since the time of Malthus. The population of Great Britain may or may not at any future time be halving itself in a generation. Our present knowledge makes such a possibility less incredible than any of the 'nightmares of population' which Malthus depicted."

Does this forecast of a diminishing Western population carry with it the threat of invasion of hordes of rapidly multiplying Orientals? The answer of Dr. Charles seems to be in the negative. Although she points out that statistics of population, births, and deaths, are very inadequate in Oriental countries, she states that the population of China is believed to have been practically stationary for a long time. That of India is probably slowly increasing.

Japan Increasing

Contrasted with China, Japan has a rapidly increasing population. The population of Japan in 1928 was 62 millions, having doubled itself since 1878, Dr. Charles indicates. The crude birth rate in 1928 was 34.4 per 1,000, more than twice that of England and Wales in 1927. Government experts estimate an increase of 30 millions by 1957, and of 48 millions by 1965.

"Such estimates have no pretensions to accuracy," Dr. Charles qualifies. "They do signify the undoubted fact that under present conditions of fertility and mortality the population of Japan is increasing rapidly."

Yet even over thronging Japan the shadow of a future decrease in numbers is hovering.

"There appears to have been a fall in the marriage rates since 1908," Dr. Charles pointed out. "Between 1898 and 1908 the average number of children born to each married woman seems to have increased. Since 1908 it appears to have fallen. The fall in fertility is most conspicuous in the group of younger mothers, whom we should expect to be most influenced by social changes such as the spread of birth control.

Threshold of Decline

"Thus Japan is possibly on the threshold of a period of declining fertility similar to the decline which has taken place in Europe. The full effects of any fall in fertility will be masked for some time by changes in the peculiar age composition and by a falling death rate.

"While the Japanese population is certain to increase rapidly for some time, analysis of changes in fertility and mortality suggest the possibility that Japan is destined eventually to travel the same road as North-Western Europe or the United States of America.

"The length of time which will have elapsed between the beginning of a decline of the birth rate and the beginning of a decline in the population of England, may be taken as about two generations. While (*Turn to Page* 302)

ORNITHOLOGY-PHYSICS

Reflectors Like Airplane Detectors Catch Bird Songs

SOUND reflectors, similar in principle to those used by military forces to detect approaching airplanes, are given much more peaceful employment by Paul Kellogg, of the laboratory of ornithology at Cornell University. Before the meeting of the American Ornithological Union, he demonstrated how he has been using a highly directional parabolic reflector with an exceedingly sensitive microphone at its focus, to capture the songs of birds in the field, and give them permanent phonographic recordings.

With an efficient portable apparatus of this kind, Mr. Kellogg has been able to overcome much of the handicap imposed by lack of soundproof studios where the wild birds sing, and also the difficulty of pushing too far forward with a frightening Juggernaut of a "sound truck," since the reflector with its microphone can be moved over a wide radius with a wire trailing back to the truck. He suggested also that the wire connection may in the near future make it possible to follow the birds with a microphone in the hand, transmitting the songs considerable distances

CAPTURING THE SONG OF BIRDS

A parabolic reflector like those used for airplane detectors finds a peace-time use in catching for recording devices the songs of wild birds.

to the heavy recording equipment in the truck, by means of a small radio transmitter carried in a knapsack.

Mr. Kellogg did not extend his suggestion to include the possible use of the same set-up as a means of putting songs of wild birds directly "on the air" by radio; but there would seem to be no fundamental difficulty about doing this with a somewhat modified apparatus, if it should be thought worth while.

Science News Letter, November 10, 1934

DENTISTRY

Advises Reducing Sugar in Diet to Avoid Tooth Decay

Mouth Washes Will Not Prevent It, Scientist Warns; Hygiene Helps; Anti-Caries Vaccine Suggested

CHILDREN of the future may be vaccinated against tooth decay just as they are now vaccinated to protect them from smallpox. For the present, cutting down the sugar in their diet and keeping their teeth clean and in good repair are the best means of protecting them against tooth decay or caries. Antiseptic or germicidal mouth washes, however, are useless in this connection.

These are the conclusions drawn by Dr. Russell W. Bunting, of the University of Michigan, in a report to the Society for Research in Child Development.

Although it seems rational to use antiseptic washes to control this disease which is caused by bacteria, they are really not effective, Dr. Bunting indicated. The organisms that cause the trouble are well protected by a film covering so that antiseptics used as mouth washes are prevented from reaching the bacteria, he explained.

"It is possible that eventually a suitable preparation may be found but, as yet, no method of controlling dental disease by the use of antiseptics or germicides has been devised," he said.

Cleanliness of the mouth does not insure lack of tooth decay. It is true that "a clean tooth cannot decay," Dr. Bunting said, but, because of the shape and arrangement of the human teeth, it is impossible to have them perfectly clean.

Good Teeth Suffer

No relationship has been found between the hardness or perfection of the teeth and the amount of tooth decay suffered by the individual. Your best teeth may decay and the softest remain unaffected, Dr. Bunting said.

Neither has the adding of calcium or phosphorus to the diet been effective in reducing tooth decay, he believes.

Sugar has, however, been found to be very important in this connection, Dr. Bunting said. A remarkably low degree of dental caries, or tooth decay, was observed in children on a low-sugar diet although the diet was deficient in calcium, phosphorus, and vitamin D.

When children who were receiving an adequate diet were given an increased amount of sugar, they began to have tooth decay. Other children who were not allowed much sugar tended to have freedom from this disease.

The possibility that dental caries might be controlled by a vaccine was explained by Dr. Bunting as follows:

"An immunologic principle antagonistic to *B. acidophilus* (the germ causing tooth decay) has been demonstrated in the blood of caries-free individuals in whose mouths, as a rule, *B. acidophilus* does not exist; and when planted therein promptly disappears," he said.

"Further studies must be made of the environment of the tooth; the local conditions which prevail in the mouth and the general systemic and dietetic states which influence them. This will involve further search in the saliva fluids for some hitherto undiscovered chemical or some immunologic principle related to the activity of the disease.

"From it may come some chemical or vaccine therapeutic method by which the disease may be directly controlled.

"Then, too, the effect of various dietary principles and programs must be studied to determine their effect on the environment of the tooth and the activity of dental caries. These, at the present time, seem to be the most promising leads for future investigation.

Practical Advice

"In the meantime, there is an earnest desire on the part of many child health workers to know what practical measures of caries control are of proven value in order that they may put them into immediate effect for the benefit of the children under their supervision. These, as far as I know, are quite meager."

The rules as set forth by Dr. Bunting are:

1. Repair of carious cavities already formed in the teeth.

2. Mouth hygiene.

3. The feeding of simple, uniform, fairly adequate diets in which sugar is reduced to a minimum.

An adoption of these measures will not insure absolute freedom from dental disease, Dr. Bunting points out. "But, as has been demonstrated in many large groups of institutionalized children, the feeding of the diet alone will prevent or greatly reduce dental caries in the great majority of children. Further than this, at the present time, we are unable to go."

Science News Letter, November 10, 1934

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DOBBIN HAULS AN ANCESTOR?

Here's a novel role for twentieth century Dobbin—hauling the bones of a two-million-year-old horse, maybe one of his own ancestors. Inset shows head and other bones of one of the horses.

PALEONTOLOGY

Find Fossil Horse Of Pliocene Period

SAND hills of Idaho, where a National Museum expedition has completed a summer of digging, have yielded 65 ancient horses and fossil bones of other wild animals of the Pliocene period. (*See SNL, August* 25, *p.* 120)

The ancestral line of modern horses is still not clearly traced, explained Dr. Lewis Gazin who directed excavation of the Idaho fossil bed. America's own ancient horses seem to have died out near the time the last Ice Age ended. That was probably no less than 10,000 years ago. After that there were no horses in America for Indians to see or ride until the Spanish explorers brought horses on their ships.

Modern Dobbin, therefore, is an "American" horse of foreign stock like other American immigrants. But the frisky ancient horses wandered considerably, and may have crossed the Bering Strait from the Old World to the New and back again more than once in the course of millions of years. So, the American horse today may have blood of ancient American horses in his veins.

Horses unearthed in Idaho by Dr. Gazin have large heads and small feet in proportion to their bodies, so that they resemble zebras in this respect.

Science News Letter, November 10, 1934

PHYSIOLOGY

Sex Gland Operations Prove Ineffectual On Cattle

SEX GLAND transplantations, one of the most-discussed of recent medical developments, had relatively little effect when tried on cattle in a series of experiments performed by Dr. Fred W. Miller, R. R. Graves and Dr. G. T. Creech of the U. S. Department of Agriculture.

Their results are not in accord with the claims made for the famous Voronoff operation on livestock, which has been widely used as a means for rejuvenating aged but once valuable breeding animals, especially in France and the U. S. S. R.

The three Department of Agriculture scientists implanted normal ovarian tissue into the bodies of several dairy cows which had various types of abnormalities in their reproductive organs, and also into two normally pregnant cows. In no case was there any apparent benefit to the sick cows, or harm to the pregnant animals.

The experimenters also implanted sex gland tissue into several bulls that had become old and useless for breeding purposes, as well as one young animal in a subnormal physical condition. After the operation, the old bulls were noticeably "pepped up" and aggressive, but their usefulness as breeding stock was not improved. There was some improvement in the condition of the young animal, but not enough to be biologically significant.

In the experiments, sex gland tissues from pigs were used on some of the animals, tissues from cattle on the others. Healing of the operational incisions was more rapid after the implantation of the pig tissue; otherwise no differences were noted.

The results of the experiments are described in detail in the *Journal of Agricultural Research,* (*Aug.* 1) published by the U. S. Department of Agriculture.

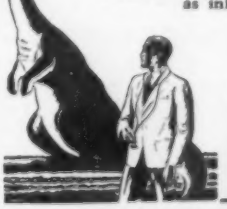
Science News Letter, November 10, 1934

JUST OUT

THE DOCTOR IN HISTORY

By
HOWARD W. HAGGARD
Author of
"Devils, Drugs and Doctors"

The story of human progress from the time when the reeking savage medicine-man struggled with the spirits down to the tremendous achievements of modern science. Lively and amusing as well as informing.



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GENETICS

Genes Traced to Individual Chromomeres in New Research

GENES, the tantalizingly elusive minute units that control our inheritance of such things as hair color and the shape of our noses, have been tracked down almost to their final lair by a scientific team consisting of an American, Prof. H. J. Muller of the University of Texas, and a Russian, Dr. A. A. Prokofyeva, of the Soviet Academy of Sciences' Institute of Genetics.

Prof. Muller, on leave from his university, has been during the past year a research guest of the Academy at Leningrad. The results which he and his colleague have attained to date were reported before the first meeting of the Academy just held at its new headquarters in Moscow. The study is similar to research recently reported by independent investigators in the United States and Russia. (*See SNL, Sept.* 29, *p.* 195, *Oct.* 13, p. 236).

Prof. Muller and Dr. Prokofyeva have dealt with chromosomes, the minute sausage-shaped bits of living substance within the cell nucleus or center. These chromosomes have been regarded for many years the abode of the genes although the exact distribution of the genes within them has never been accurately determined.

Now one of the outstanding results of the Muller-Prokofyeva research has been to trace known gene groups to definite locations within the chromosomes. They have made a much a more exact map of their places of residence than has hitherto been possible. They have traced home to individual chromomeres the particular genes they singled out for study. Chromomeres are subdivisions of a chromosome only about one hundredth the size of the larger bodies.

The smallest bit of chromosome stuff with which Dr. Prokofyeva has worked had a diameter about equal to the shortest wavelength of visible light which is sixteen millionths of an inch. Yet in or on that tiny particle there was room for several genes.

The two investigators hope that before long, they may be able to break off chromosome particles so small that they can contain only one gene apiece, and thus obtain a definite measure of the size of the individual gene.

The new attack on the secret of the chromosomes was made possible by two previous developments.

First, by a method of inducing mutations or evolutionary changes in organisms through bombardment with X-rays, developed by Prof. Muller some years ago.

Second, by a new technique in staining chromosomes and mapping the gene locations on them, which was announced for the first time (*Science, Dec.* 22, 1933) by Prof. Muller's colleague at the University of Texas, Prof. T. S. Painter.

By bombarding the chromosomes with X-rays, and then studying the breaks and shifts in their minute structure thus caused, Dr. Prokofyeva was able to make a map showing where gene changes should be expected. At the same time, Prof. Muller prepared another map, on a purely genetic basis, showing the locations of the gene changes. When the two maps were compared, they were found to correspond exactly, constituting a very nice case of mutual scientific support.

Sometimes the X-ray bombardment resulted in the dislodgment of a bit of chromosome carrying a few genes, which found its way to an entirely new place on the line-up and worked its way in, like a bird chased off a telegraph wire by a small boy's stone wedging itself into another roosting place without dislodging any of the crowded birds already there. Such newly-located chromosome fragments carry their genes into places where the interaction between the transferred genes and those already in place produce marked changes or mutations in the appearance of the resulting organism. The effect of a gene or gene-group thus appears to depend at least partly on its interaction with its neighbors, and not altogether on intrinsically possessed powers of its own. This "position effect" is a discovery that may be of great importance.

Science News Letter, November 10, 1934

VITALISM
and
MECHANISM
A DISCUSSION
between
HERBERT V. NEAL
Professor of Zoology, Tufts College
and
JAMES F. PORTER
Being a survey of these opposing theories from the point of view of a scientist and a layman.
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From Page 299

it would be rash to assume that this fact gives any clue to the length of time such a process might take in Japan, it does give some indication of the order of magnitude of the time period during which spectacular changes in population can take place. Probably the prospects of a declining population would not have seemed any less remote to the Englishman of 1880 than they do to the Japanese of today.

"The Japanese themselves are naturally less concerned with the state of the population 50 or a 100 years hence than with the problems raised by the addition of many millions during the next few years."

Although the rapid spread of the practice of birth control is recognized by Dr. Charles as one of the factors contributing to the diminishing family, to blame the dissemination of birth control information for small families is, she considers, to put the cart before the horse. Rather a change of social ideas has produced the desire for birth control information and its spread.

Not New

Birth control methods are known to have been used in Bible times, she declares, and many of the artifices widely used today were already known before the end of the eighteenth century. But changing social conditions have recently brought about a different attitude toward parenthood. Children today are felt to be a burden.

The increasingly long period of dependent childhood and youth, together with a lack of economic advantage for the father of a family, combine to make the child a financial burden. New ideals in education and new social ambitions combine to make the child a social burden. The modern child psychologist comes in for his share of the blame for the new dread of parenthood.

"Psycho-analysis has assisted in transferring the burden of original sin from the child to the parent," Dr. Charles comments. "Fortified with beard and Bible, the Victorian father shouldered his responsibility for the misdeeds of

his offspring light-heartedly. Deprived of their protection, the modern mother approaches her task with the misgiving that the most trivial inepitude may lay the foundations of a psychoneurosis."

In order that man may be saved from a sort of self-imposed extinction or social sucide, the child must be restored to his proper place in society, Dr. Charles believes. He must be regarded as a social asset, not as a burden.

Dr. Charles envisions for the future a non-acquisitive society in which the child from the age of three upwards would take his place as a useful contributing member. The educational system would no longer force mathematics on children who have nothing to measure, foreign languages on children who have no opportunities to use them for social intercourse, literary composition on children who have nothing to write about, and geography on children who have never travelled beyond the confines of one country.

Rather they would be trained, Montessori fashion, to look after their own needs, and later to contribute productively to welfare of society. Children and adults would share equally in the activities of both production and education, in Dr. Charles' future society.

The extra work and care necessary for babies and very young children would be compensated by a recognition of the creative possibilities presented by a new mosaic of hereditary combinations, she predicts. Each new generation will be welcomed as an opportunity for a fresh educational experiment.

"One of the depressing aspects of a falling birth rate is the over weighting of the community with the mentally and morally tired," Dr. Charles warns with regard to the present tendency toward an increasing number of old people in the nation.

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Science News Letter, November 10, 1934

PLANT PATHOLOGY

Repeal Promotes New Plant Disease Studies

REPEAL of prohibition has re-opened a new avenue of scientific research in plant diseases, especially those of hops. Dr. G. R. Hoerner, agent of the United States Department of Agriculture located at the Oregon Agricultural Experiment Station announces the differentiation of three distinct classes of crown gall, or plant cancer, of hops.

Science News Letter, November 10, 1934

ORNITHOLOGY

NATURE RAMBLINGS
by Frank Thone

Old Corvie

ROBIN and thrush and meadowlark are far away, and it will be many weeks before we hear their songs again. But one song we can always be sure of hearing if we will go out into the country a little distance. Old Corvie is a faithful fellow, even if his voice is harsh.

The crow seems to be one of the most versatile birds in the world. Perhaps that is why he can stick around in the winter, when the gentler but less hardy songsters have had to clear out. You find the crow all around the earth, apparently without any difference of species, from Kamtchatka to Kalamazoo.

Although crows are found in lands where it is cold, it is true that they do migrate. But like many hardy birds, they migrate only comparatively short distances, so that when the crows we have in summer go away, others from a little farther north come to spend the winter with us. And not infrequently the same sly thieves we have had with us in summer decide not to go south at all.

Another reason why the crow is able to get along in so many lands and under such a variety of climates is that he is not at all fussy about what he eats. He is quite as versatile in that respect as man himself, or as that other great thief from man's stores, the common rat. Animal food, whether living or carrion, vegetable food, whether fresh grain sprouts or garbage—it is all the same to his black majesty.

Finally, the crow survives because he has very good wits for a bird. All sorts of anecdotes can be told of the shrewdness of crows, in "spotting" would-be hunters even in the shelter of thick brush, or of knowing whether or not you have a gun with you.

Science News Letter, November 10, 1934

CHEMISTRY

Organize Clearing House For Heavy Water Research

SO FAST and furious has research progressed on a study of the heavy isotope of hydrogen that a "clearing house" for coordinating and promptly reporting new discoveries has been organized. A Committee on Hydrogen Isotopes has been organized by the National Research Council with Prof. Harold C. Urey of Columbia University, New York, one of the co-discoverers of the heavy-weight isotope, as chairman.

It is believed the work of the committee will prevent, in the future, duplication of research investigations where they seem undesirable.

Science News Letter, November 10, 1934

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First Glances at New Books

Science Education

SCIENCE IN THE NEW EDUCATION—S. R. Slavson and Robert K. Speer—*Prentice-Hall,* 393 p., $2.50. From the standpoint of new discoveries and developments in science, the postgraduate instruction in universities is perhaps most important, but so far as the general public is concerned the most important period of science inoculation during their formal education is during the elementary grades. The competent authors have performed a real service in re-examining science in relation to education in this book. They discuss science education for the elementary grades as experience in the development of the total personality which is the game of education generally. Practical suggestions are given in what is called the "search discovery method."

Science News Letter, November 10, 1934

Medicine

THE DOCTOR IN HISTORY—Howard W. Haggard—*Yale Univ.,* 421 p., $3.75. With his usual charming and highly readable style, Dr. Haggard describes the part played by doctors and medical science in the history of the human race from earliest times to the present.

Science News Letter, November 10, 1934

Electricity

ELECTROMANUAL VOLUME 1—I. G. Terry, W. A. Dickinson and W. L. Hunter—*Burgess Pub. Co.,* 77 p., mimeographed, $1.45—Mimeographed laboratory manual for an introductory course in high school electricity. Three dimensional drawings of apparatus do a creditable job of showing wiring diagrams but lack the professional artist's touch.

Science News Letter, November 10, 1934

Chemistry

THE FARM CHEMURGIC—William J. Hale—*Stratford Co.,* 201 p., $2. A call to arms to assemble science, put agriculture on a chemical basis and thus wipe out depressions. Dr. Hale gives his idea of how this worthy aim may be accomplished, based on the new knowledge of how to turn farm products into a variety of raw materials for industry. Farms of the nation embrace 980,000,000 acres, of which about a third are under cultivation. Yet the food and raiment needs of the country can be supplied by 100,000,000 acres. The proper application of scientific farming, Dr. Hale believes, could reduce within five years the needed acreage to only 50,000,000. What will the farmers do then when four out of five of them, even now, need work no more? In the industrial applications of farm material such as alcohol from grain for fuel and in alpha cellulose from wood and other forest products, Dr. Hale sees the answer.

Science News Letter, November 10, 1934

Political Science

NEW FEDERAL ORGANIZATIONS, AN OUTLINE OF THEIR STRUCTURE AND FUNCTIONS—Laurence F. Schmeckebier—*Brookings Institution,* 199 p., $1.50. For those who deal with the Federal Government in its multiplex activities this handbook, summarizing the new developments in the organization of the Federal Government between March, 1933, and July 1, 1934, will be an invaluable aid. It is the product of the Brookings Institution's Institute for Government Research which in the past has surveyed so effectively the older divisions of the Federal Government.

Science News Letter, November 10, 1934

History

NEW SOURCES OF INDIAN HISTORY—Stanley Vestal—*Univ. of Oklahoma,* 351 p., $3.50. Mr. Vestal has called this volume on Sioux history a miscellany, because it contains the overflow of his biographic study of Sitting Bull. Here are the historic documents on the Ghost Dance and the death of Sitting Bull in 1891, many of these papers never before published. Here, too, is new source material on the history of the Sioux Nation, compiled from Indian statements and testimony of white eye witnesses. The volume is seventh in a series on the civilization of the American Indian.

Science News Letter, November 10, 1934

Astronomy

ELEVENTH REPORT OF THE SECTION FOR THE OBSERVATION OF VARIABLE STARS, 1925-1929—*British Astronomical Association,* 403 p., members, 5 shillings; non-members, 10 shillings, plus postage and duty.

Science News Letter, November 10, 1934

Chemistry-Physics

HANDBOOK OF CHEMISTRY AND PHYSICS: 19TH EDITION—Ed. by Charles D. Hodgman—*Chemical Rubber Pub. Co.,* 1933 p., $6. Hardy perennial that it is, the Chemical Handbook for the new school year has now grown to 1933 pages—an increase of 115 pages from the last edition. New information includes the crystallographic data on over a thousand substances. The thermodynamic properties of ammonia and other refrigerants cover fourteen pages. The collection of integrals has been greatly increased.

Science News Letter, November 10, 1934

Archaeology

ANTIOCH ON-THE-ORONTES, I. The Excavations of 1932—Edited by George W. Elderkin—*Princeton University Press,* 156 p., 171 pl., 200 figs., $12. For six years, beginning in 1931, a group of American and French institutions have the right of excavation at Syrian Antioch. Since this is the only city of the "big four" in the Late Roman Empire which can be extensively excavated now, Antioch is relied upon to give the fullest picture of life and art in a metropolis at the close of the ancient world. In this beautifully produced report, eight contributors discuss findings of 1932, including lamps, coins, Greek and Latin inscriptions, the circus ruins, baths, and remarkable mosaics which show for the first time what the style of painting was like in this influential city.

Science News Letter, November 10, 1934

Anthropology

THE STORY OF THE AMERICAN INDIAN—(rev. ed.)—Paul Radin—*Liveright,* 383 p., $2.50. Pushing into the background the "things" that archaeologists have dug up and use to explain America's ancient history, this anthropologist stresses results of all the digging and inquiring. He tells the story of the rise and fall of civilizations in Indian America, just as he might write European ancient history. The first edition appeared in 1927.

Science News Letter, November 10, 1934

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